Water plays a defining role in the natural beauty, heritage, and economy of Clark County. And, the way we use our land significantly influences the health of our waterways. The more our population grows and land is developed, the greater the strain on Clark County's numerous streams and lakes.

So, how healthy are Clark County's streams and lakes, and what are we doing to maintain and improve their condition? This Stream Health Report summarizes the current status of Clark County's streams, rivers, and lakes and provides a basis for future comparisons. The county map (on page 3) shows the locations of our streams, lakes, and watersheds. More detail is provided in the attached reports for each Clark County watershed.

Data describing every stretch of stream and lake in the county is not currently available. Since the inception of the clean water fee, however, we have increased water quality monitoring and what we know about land use in the county. This is our first overview of stream and lake health using information collected since the early 1990s.

Preserving and improving streams and lakes

Streams and lakes support complex biological systems. Changes that degrade streams and lakes have occurred since the first settlers began clearing land for homes and farms. Degradation has increased as more land is cleared and more areas of Clark County are converted to businesses, homes, roads, and public facilities. Consequently, preserving and improving stream systems is a complicated and challenging process.

The first and most crucial goal, especially in an area where population is growing as quickly as Clark County, is to control degradation and maintain existing stream health. Clark County is committed to protecting our water through a variety of programs and improvements to:

- Enforce county regulations to prevent soil erosion and pollution from construction
- Require new projects to build stormwater treatment facilities
- Enforce regulations limiting clearing and construction in wooded areas along streams

> "When the well is dry, we know the worth of water."
>
> *— Benjamin Franklin, 1746*

- Clean and maintain roads and stormwater facilities to minimize pollution
- Educate people about how to protect streams and lakes through everyday actions
- Monitor stream and lake health to identify specific problems, remove pollution sources, and to check for changes over time

Stormwater facilities include, but are not limited to, pipes, swales, ditches, culverts, street gutters, holding ponds, retention ponds, constructed wetlands, infiltration devices, grassy swales, etc.

What is a watershed?

A watershed refers to the area of land that drains (sheds water) to a stream or system of streams. Watersheds can be large or small. For example, the Columbia River watershed runs from British Columbia to the river's mouth at the Pacific Ocean and includes all the streams and rivers that feed into the Columbia River. On a smaller scale, each stream or river within the Columbia River watershed also has its own watershed — the area of land that drains only to it.

What are the characteristics of a healthy stream or lake?

Most of us picture a healthy lake or stream as fresh and clear — inviting a swim, or a day of fishing. Experts look for specific and measurable indicators of healthy streams and lakes. These characteristics are summarized below.

- **Stream life.** Healthy streams have insects, crustaceans, and other aquatic organisms living in the streambed. Since the water is both their home and source of food, these animals react strongly to deterioration in streams. Changes in their quantity and variety can indicate problems. Generally, when stream health is poor, there are fewer types of aquatic life and a dominance by those that tolerate pollution. Better quality streams have a greater diversity of insects and have species that don't tolerate pollution. Aquatic life is considered to be one of the strongest measures of the overall biological health of a water body.
- **Disease-causing organisms.** Water resource agencies measure bacteria such as E. coli and fecal coliform indicator of the potential risk to humans from contact with water. Wildlife, farm animals, broken sewer lines, and failing septic systems are among possible sources. These bacteria are considered to be a measure of risk to human health. The higher the levels, the higher the risk.
- **General water quality.** Temperature, pH, the amount of oxygen in the water, nutrient (phosphorus and nitrogen) levels, and other chemical constituents in the water are key tests for water quality. Highs and lows of these measures tell a story. For example, high temperatures might suggest the lack of shading along a stream, which can, in turn, contribute to a decline in the number and health of the fish population. Other readings might suggest the presence of oily or dirty runoff from streets and parking lots, fertilizer in runoff, soil eroded from construction sites and fields, or an area with failing septic systems.
- **Disturbance and development on land.** Where there has been little or no human disturbance, streams and lakes are usually healthy. There is a direct correlation between land use and lake or stream health. Consequently, we can use land use as a reasonably good predictor of water quality. Where land has been highly disturbed or developed from its natural state, stream and lake health is often lowered.

Probable stream health

Clark County Public Works compared general stream health scores for many streams to the land uses in their drainage areas and developed a simple method to predict stream health where there is no usable field data. The "probable" health score is determined by the amount of the drainage area in forest and developed residential or urban areas.

Clark County Watersheds

Stream or lake health problems, indicators, sources, and possible solutions

Stream health problems or pollutants can develop from a variety of sources depending on influences from human activities and natural conditions. The table below lists types of pollutants or causes of water body health problems, indicators that are used to measure the problem, sources of the problem, and solutions that may work to control or reduce these sources.

Problem/pollutant	Indicators	Sources	Solutions
Disease causing organisms	E. coli and fecal coliform bacteria	Livestock Pet waste Broken sewer lines Failing septic systems Wildlife	Agriculture Best Management Practices Education Projects to find and remove sewage leaks Septic system inspections and maintenance
Hydrology changes (increased runoff)	Flow measurements Computer models Channel erosion measurements Stream life	Cleared forests Increased impervious surfaces from roads and buildings	Development regulations for stormwater management Forest retention and restoration Construction designs to reduce runoff
Temperature Dissolved Oxygen	Direct measurement Stream life	Loss of riparian vegetation	Restore vegetation to shade streams
Nutrients (phosphorus and nitrogen)	Laboratory tests Excessive plant growth	Livestock Cropland Landscaped areas Broken sewer lines Failing septic systems	Agriculture Best Management Practices Stream vegetation buffers Reduced fertilizer use Projects to find and remove sewage leaks Septic system inspections and maintenance
Sediment	Turbidity Suspended sediment Stream life	Construction projects Land clearing Bare fields Channel erosion	Erosion control regulations Agriculture Best Management Practices Stream bank restoration
Toxic substances (pesticides, metals, and petroleum products)	Stream life Laboratory tests	Urban areas Agricultural activities	Education Alternative pest controls Source control enforcement Stormwater development regulations Stormwater facility retrofits

What are hydrologic modifications and why are they a problem?

Hydrologic modifications are changes to how water flows into and through a stream. In a pristine forest, little rainfall goes directly to streams as runoff. Much of it is caught by trees and never hits the ground. Water that does make it to the forest floor soaks into the ground and slowly filters toward streams. Under forested conditions, most stream flow is from seeps and springs and doesn't change much when it rains. Clearing forests for fields, homes, and towns changes this hydrology in a way that degrades stream health. The biggest change is rainfall that once soaked into the ground and fed stream flow as seeps and springs, now runs off fields, roofs, and roads, rushing down ditches and storm drain pipes into creeks. During rainstorms, this creates high flows that erode and widen stream channels, making them less suitable for fish and other stream life.

How do manmade stock and fish ponds degrade stream health?

Many people have ponds on their property. Some are mainly for the kids to catch fish, maybe even paddle a boat, or go for a swim. They were also built to water livestock and hold water for irrigating fields and lawns. But ponds built in stream channels can harm stream health because they warm the water in the summer sun and attract waterfowl that leave waste.

Report organization

Each of the following ten watershed sections has a brief description of the watershed and the health of its streams and lakes. There is also a detailed discussion of conditions and possible management options for representative tributary streams.